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Resilience, vulnerability, & transformation: Exploring community adaptability in coastal North Carolina

Candace K. May

Department of Sociology & Rural Studies, South Dakota State University, Hansen Hall 004, Box 670A Brookings, SD 57007, USA

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ABSTRACT

Community resilience approaches are often criticized for failing to recognize how community adaptability is shaped by multiple levels and scales of heterogeneous power relations. A power framework for understanding community resilience is presented and applied to a qualitative case study of Two Rivers, a historical fishing community in North Carolina. Community functions, structures, and identity were fundamentally transformed from commercial fishing-based livelihoods to recreation and leisure-based lifestyles as Two Rivers fishers transitioned out of the fishing industry and relocated out of the community. The vulnerability context of Two Rivers consisted of compounding shocks from market competition, weather-related events, and rural restructuring involving amenity migration and development. The power framework draws attention to how the adaptability of the Two Rivers community was shaped by differential power among groups within and outside the community, structural power in the institutional and bureaucratic imperatives of governance systems, and the systemic power of generalized values, norms, and preferences driving coastal development trajectories. The utility of the power framework is a map of resources, capacities, and opportunities and barriers within and external to communities to more effectively understand and/or facilitate group and community adaptability for resilience or potentially more radical transformations toward sustainability.

1. Introduction

Changing demographic characteristics, market dynamics, and complex and increasingly unpredictable environmental contexts are challenges for rural, coastal communities (Cinner, 2009; Jurjonas and Seekamp, 2017; Sam et al., 2017; van Putten et al., 2016; Wu and Tsai, 2016). In the best of times, rural coastal communities are vulnerable to weather events and flooding as a result of geographic location; limited access to health care, goods, transportation routes, and other services as a result of social isolation; sensitivity to market fluctuations from high levels of natural resource dependence; and, adaptive capacity challenges from high levels of poverty and inequality associated with limited or changing economic opportunities and demographic shifts (Cutter et al., 2016). Understanding the ability of coastal communities to navigate barriers while capitalizing on opportunities in response to a variety of internal or external changes and disturbances stemming from social, market, or weather-related events is all the more important in the context of increasing climate variability. There are a variety of frameworks to understand community adaptability – the capacity to respond to external or internal challenges (Bevacqua et al., 2018) and many approaches for facilitating community resilience (Cinner et al., 2018; Smyth and Vanclay, 2017). However, the mechanisms associated with adaptability, which shape mobilization of adaptive capacity, are not well defined in the resilience, vulnerability, or community development literatures. In general, there is a lack of critical examination of communities as sites of conflict and power embedded in broader political economic processes and relationships (Agrawal and Gibson, 2001; Berkes and Ross, 2016; Ojha et al., 2016; Quandt, 2018).

Lack of specificity in the components of adaptability and communities is the root of resilience scholars' (Berkes and Ross, 2016; Clarke and Mayer, 2017; Ingalls and Stedman, 2016; Lyon and Parkins, 2013) questions of how to account for agency, structure, and power in community self-organization. Understandings of community resilience often draw on functionalist and static institutional assessments (Cote and Nightingale, 2012; Davidson, 2010), broader notions of neoliberal or development discourses (Walker and Cooper, 2011; Watts, 2011), or normative understandings of communities as sites of social bonding and solidarity (Gurney et al., 2017). The purpose of this manuscript is presentation of a power framework for analyzing community resilience that accounts for the effects of the differential capacity of individuals and groups within and across communities, structural barriers and opportunities at the governmental and policy levels, and the broader context of political economic imperatives in how communities mobilize in response to shocks and disruptions. The literature review briefly

E-mail address: candace.may@sdstate.edu.

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discusses undifferentiated treatments of adaptability and communities in three foundational approaches to understanding and facilitating community resilience – the sustainable livelihoods framework (SLF), vulnerability and resilience indices, and strengths-based community development approaches. The power framework is explained and applied to a case study of a historical commercial fishing community in North Carolina. The conclusion considers the utility of the power framework for understanding and/or facilitating group and community adaptability.

2. Literature review: adaptability and community

wResilience is the ability to maintain a degree of continuity in essential functions, structures, identity, and feedbacks during or following responses to shocks or disturbances (Nelson et al., 2007). Responses to past, present, and/or expected changes or disturbances are adaptations (Smit and Wandel, 2006). Potential shocks and disturbances stem from population shifts, changing development trajectories, market fluctuations, conflict and competition for resources, and ecological changes and weather events associated with climate change. Adaptations may be reactive or pro-active and more or less effective; responses span resistance to change, continuity in change, or transformation to a new resilience regime (Engle, 2011). Exposure (degree of stress), sensitivity (degree of potential harm), and low adaptive ability to respond to shocks and disturbances indicate vulnerability, but not necessarily a lack of resilience (Adger, 2006; Cutter et al., 2008). Adaptability offsets vulnerability and informs resilience by shaping adaptations. While adaptations are the actual response that affects resilience, adaptability is the capacity to respond.

Adaptability is the collective ability to respond to shocks and disturbances by learning and applying experience in mobilizing the material and non-material resources that constitute adaptive capacity (Folke et al., 2010). Hence, adaptability involves two components: adaptive capacity (resources) and the ability to act collectively, which is shaped by the broader context of structural barriers and opportunities and systemic processes of socio-ecological change and development. Collective action is also shaped by differential and unequal access to and control of resources, which often produces conflict (Baland et al., 2007; Olson, 1965; Wisner et al., 2003). Specification of the contextual components of adaptability and recognition of differential access to resources among groups, which may produce conflict within and across communities, is integral to understanding the processes and outcomes of adaptations for community resilience and transformation.

2.1. Sustainable livelihoods, resilience, and vulnerability

Much of the resilience and vulnerability literature lack specificity in the components of adaptability. The terms adaptability and adaptive capacity are often used interchangeably (Engle, 2011; Lemos et al., 2016), which precludes an examination of structural factors and systemic processes. Resilience and vulnerability approaches have primarily drawn from the sustainable livelihoods framework (SLF) to understand social adaptability (Cutter et al., 2008; Lemos et al., 2016; Smit et al., 2001). SLF proposes five capital assets (human, social, physical, financial, and natural) used to cope and recover from stressors and shocks at the individual and household levels (Chambers and Conway, 1991). According to SLF, the mediating context for the utilization of capital assets is the policies, institutions, and processes (PIPs) governing distribution of resources and socio-environmental relations (Scoones, 2015). While SLF scholars advocated treating capital assets and PIPs as analytically distinct, many development scholars and practitioners combined them into quantitative indices of adaptive capacity (Scoones, 2015), which McLean (2015) described as a Pentagon Prison. These quantitative approaches sacrificed flexibility and the ability to account for politics, power, and context for research expediency and generalizability (McLean, 2015; Scoones, 2015; Smyth and Vanclay, 2017). This trend is observable in current resilience and vulnerability research.

The most cited indices of resilience and vulnerability (Cutter et al., 2003; Cutter et al., 2008) combined indicators for political engagement and representation with access to resources, such as information, knowledge, and technology; social capital; beliefs and customs; building stock and age; frail and physically limited individuals; and, type and density of infrastructure and lifelines. Following these models, Reams et al. (2012) combined limited political power and local government actions with 43 variables measuring 'other' capital assets to assess resilience-capacity index scores for the 52 coastal counties of the Gulf of Mexico region. The utility of resilience and vulnerability indices is assessing strengths and needs in community development and disaster preparedness strategies. However, indices do not produce an understanding of how adaptability is shaped in discrete ways by group level characteristics, institutional and organizational factors, and systemic processes. Although adaptive capacity is to some extent measurable through concrete indicators representing material and non-material resources, indices do not indicate how or to what extent resources will be mobilized in the process of coping or adaptation. As Davidson (2013) noted, adaptive capacity is an indicator of potential, not actual ability to withstand stress or reorganize and adapt. A seemingly vulnerable community, as indicated by social or ecological characteristics and resources, may have a high degree of resilience as a result of institutional and organizational factors and systemic processes, and vice versa.

2.2. Community assets: undifferentiated and locally bounded

Failure to differentiate resources from context, outcomes, and process in understanding adaptability and resilience is often paired with a tendency to treat communities as homogenous, locally bounded entities. This tendency in commons-based governance scholarship is well noted (Brisbois et al., 2018; May 2018; Quandt, 2018), but is also evident in two of the most highly cited applied, community development approaches, the asset-based community development (ABCD) approach (Kretzmann and McKnight, 1993; Mathie et al., 2017) and community capitals framework (CCF) (Flora and Flora, 2013; Pigg et al., 2013). In contrast to externally identified needs-based assessments, such as those based on resilience and vulnerability indices, applied community asset approaches focus on community members' real and perceived strengths (Emery and Flora, 2006; Mathie and Cunningham, 2003; Smyth and Vanclay, 2017). Community identification of strengths and mobilization of capacities for goal attainment are facilitated, but not dictated by external practitioners. Mathie et al. (2017) noted the potential for ABCD applications to activate collective action (power to) against oppressive conditions (power over) through fostering power with and within communities (a sense of relational and self-efficacy).

While practitioners of community asset-based approaches recognize the importance of addressing conflict and power, the responsibility of identifying marginalized groups, power relations, and broader structural factors as targets, opportunities, or barriers for problem solving is placed in the hands of community members. As McKnight and Russell (2018: 6) explained in an overview manual for ABCD:

> "Community Organizers can be helpful when it comes to figuring out tactics for deep inclusion and addressing issues of conflict and power imbalance alongside a range of other important functions. They can help build the ship, but they must never become the ship's captain."

The foundation of asset-based approaches is faith that the best possible outcomes are achieved when a community is able to utilize available skills and resources and organize for goal achievement free from external constraints and dictates. This faith is reflected in the emphasis on community self-organization in resilience scholarship (Berkes and Ross 2013, 2016; Imperiale and Vanclay, 2016). However as Smyth and Vanclay (2017) noted, ABCD lacks an adequate guiding framework; there is potential for community members to mis-recognize or mis-value resources. Furthermore, questions about how to deal with communities as sites and sources of inequality, conflict, and power are left

vague and largely unaddressed by ABCD. Appraisals of CCF are similar to ABCD. Although CCF provides an extensive framework of capital assets to guide facilitated community assessments and empowerment, authors have noted a lack of conceptual specificity, inadequate attention to local and extra-local conditions in shaping collective action (Pigg et al., 2013), and inattention to cultural diversity and consolidation of power (Hale and Carolan, 2018). A complimentary framework is needed to understand how community capacity is shaped by internal and external power dynamics and the broader political economic system.

2.3. A power framework for community adaptability

Combining the scholarship on collective action and commons governance (Baland and Platteau, 1999; Ostrom, 1990), asset-based community development (Flora and Flora, 2013), and vulnerability (Cutter et al., 2016; Wisner et al., 2003) with sociological perspectives on power and stratification focuses attention on the structures and processes across scales and levels that shape adaptability. The power framework presented here includes differential, structural, and systemic forms of power to specify the scales and levels of governance systems that shape community adaptability (May 2016). Governance processes occur at multiple levels of hierarchically organized politico-administrative units positioned across temporal, spatial, jurisdictional, and/or analytic scales (Cash et al., 2006). Analytic scales include the science-traditional ecological knowledge divide (Cash et al., 2006) and, for the purposes of this manuscript, formal and informal governance realms (May 2013). At the individual and group levels within and across communities, differential capacities derive from stratified access to or control of material and non-material resources – cultural, social, and economic capital (Bourdieu, 1990). Individuals or groups competitively deploy differential capacities in contexts of conflict or collectively mobilize pooled differential capacities as adaptive capacity in contexts of cooperation across formal and informal governance realms.

The formal governance realm consists of the institutions (legislation, policies, rules, and regulations), organizations (governmental, nongovernmental, and professional), and stakeholders involved in policy processes regarding use, access, and allocation of resources (May 2013). Structural power is evident at the policy level of formal governance in the ways institutional and organizational imperatives (Mann, 1993) produce structural barriers, opportunities, and resources, which shape the effective deployment of differential or adaptive capacities. The informal governance realm involves locally derived and collectively enforced means of controlling and distributing resources and providing public goods, exclusive of government involvement or external influence (Ostrom, 1990). Informal governance processes involve institutions, organizations, and user groups in activities outside the policy process, which may directly oppose, reproduce, or exist separate from the formal governance system (May 2013). Systemic power is observable in the ways generalized values, norms, and preferences underlying the strategies, institutions, and technologies of political-economic imperatives shape local, disciplinary practices of informal governance (Foucault, 1978). Analytically differentiating formal and informal governance realms allows for an examination of how internal and external factors shape community adaptability to shocks and disturbances. While the formal governance realm crosses multiple hierarchical levels of decision-making and jurisdictional scales, the informal governance realm is localized and place-based; both realms may involve social networks, associations, and affiliations with linkages across geographic areas. The framework is used to explained the transformation of a traditional fishing community, Two Rivers,[1] NC.

3. Data collection

The methodological framework for this project was a qualitative case-study design. Qualitative methods provide valuable insight into context-specific perceptions, interpretations, and actions and behaviors, which generates analytical, rather than broad, generalizations to populations (Yin, 2014). As Marshall and Rossman (2006) noted, qualitative methods are useful to explain where and why policy and local circumstances and practices complement or contradict each other. Case-study design improves validity (Yin, 2014) through “between or across method triangulation” (Denzin, 1970); data collected from multiple sources through a variety of techniques allows for the comparison and cross verification of information.

Data collection occurred between January 2007 and March 2013 and included observations, interviews, and analysis of existing statistics, documents, and policies. A purposive sampling technique was used to ensure diversity in units of analysis to meet the information requirements of the research questions (Berg, 2007). Research questions focused on individual and group assets and capacities, barriers and opportunities to participation in fisheries and environmental decision-making processes, relationships and interactions across groups and community-policy contexts, and coastal community transformations. Federal and state fisheries and environmental legislation, policies, and statistics, fisheries meeting minutes, and proclamations, stock status reports, and issue papers, as well as media accounts of relevant debates were reviewed. Collection and analysis of documents and existing statistics occurred throughout the study period, contact with the community of Two Rivers began in 2009, and observations and interviews were primarily completed in 2009. Observations were conducted in the community, at fishing docks, and during fishery meetings convened by NC Division of Marine Fisheries and National Marine Fisheries Service.

Forty formal, semi-structured interviews with commercial fishers (22); coastal residents (9); and, scientists, administrative personnel, and user-group representatives serving on fishery committees (9) were recorded and transcribed after attaining informed consent. The semi-structured interview format allowed for variation in determining meanings, understandings, and experiences across groups and contexts, while ensuring data collection according to the research questions. Numerous informal interviews (86) in the form of conversations (Burgess, 1982) were documented as components of field notes. Field notes included analytic memos and details of researcher interactions to track changes in the researcher, the setting, and treatment of people and data as advised by Rubin and Rubin (2005). Grounded theory and ethnography were incorporated in an iterative process of research and analysis as discussed by Charmaz and Mitchell (2001) and Emerson et al. (1995). The qualitative software program, ATLAS.ti was used for data management. Analysis followed a substantive coding process informed by the research questions. Broader conceptual themes illustrating different forms of power at multiple levels and scales of governance emerged in the analysis and writing phases.

4. Study site and context

Two Rivers is a small, unincorporated place in the Inner Banks region of NC. Whereas the Outer Banks refers to the barrier islands extending from Currituck Beach to Cape Lookout, the Inner Banks consists of the mainland coastline internal to and surrounded by the barrier islands (Fig. 1). NC has more than 4000 miles of shoreline and 2.5 million acres of coastal water, of which 2.3 million acres are estuarine (Deaton et al., 2010). The Inner Banks comprise 3000 miles of shoreline along the estuarine waters, which provide essential habitat for a variety of protected species, produce more than 90 percent of commercial and more than 60 percent of recreational landings, and attract significant amenity-driven development and in-migration (Deaton et al., 2010).

The majority of the approximately 2,500 active commercial fishers in NC (NCDMF, 2017a) represent small-scale fishing firms of typically

[1] Two Rivers is a pseudonym to protect the confidentiality of research participants. Attempts were made throughout the presentation of data to protect the identity of the community and people who contributed to this study.

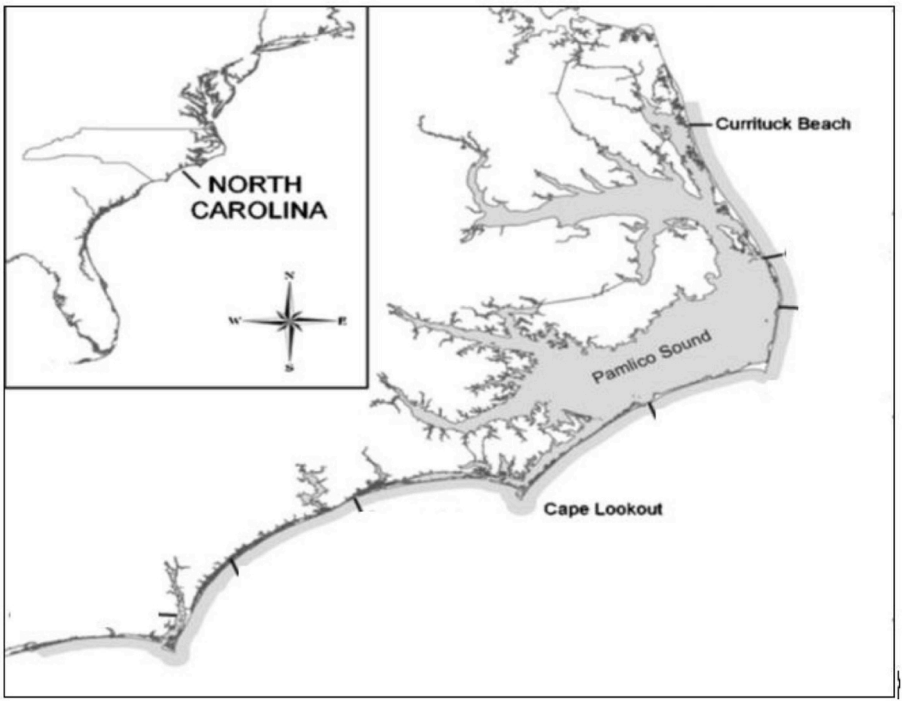

Fig. 1. Map of coastal NC.

one or two people on boats classified as small (27% are less than 19 ft in length) or medium (70% are between 19 and 38 ft in length) (Hadley and Wiegand, 2014). Fishers from the Inner Banks region typically fish close to home in the coastal, estuarine waters; they harvest species and use gear according to the season or availability of fish (Hadley and Wiegand, 2014). Although market competition, extreme weather, and coastal development are challenges for all commercial fishing communities (Colburn and Jepson, 2012), small-scale fishers are particulary vulnerable. Compounding socio-ecological shocks and disruptions often result in reduction of fishing firms and consolidation of fishing effort. For example, between 1996 and 2012, shrimp imports in the US more than doubled (5.28–10.87 million pounds) (NOAA, 2014). Over that time period, NC shrimp prices decreased by more than $1.00 per pound (adjusted to 1996 dollars); commercial shrimpers decreased by 47 percent; and, the quantity of shrimp caught per shrimper more than doubled (NCDMF, 2013).

In addition to market competition, weather related extreme events are a problem for commercial fishers. NC has experienced more billion-dollar weather-related damage events than any other state in the US (NCILT, 2012). Damages from hurricanes have been particularly costly for NC (e.g., Matthew caused $10.1 billion in damages in 2016, Irene caused $14.6 billion in 2011, and Floyd caused $9.5 billion in damages in 1999) (NOAA, 2017). In 2011, Hurricane Irene caused four to seven feet of storm surge along the Outer Banks and between five and nine feet on average along the Inner Banks region, with some areas experiencing over 12 feet (NOAA, 2012). Two Rivers interviewees reported a loss of 90 percent of homes in their communities and substantial damage to boats and docks. In addition to property losses, fishery-based livelihoods are significantly affected by the consequences of flooding for the health of fish populations. Flooding washes nutrients and organic matter (e.g., lawn clippings, leaves, corn stalks and straw to manure, sludge, wood and food processing wastes) into coastal waters, which produces dead zones, where algae blooms and low-oxygen bottom waters cause fish and shellfish die-offs (Dybas, 2018). Flooding from Hurricanes Floyd, Irene, and Matthew produced dead zones and fish kills that lasted months (Dybas, 2018).

Amenity-led development, or coastal gentrification in NC is a further source of vulnerability for commercial fishing communities (Colburn and Jepson, 2012). Coastal NC is ranked 27th in population density out of 31 coastal states (NOAA, 2013), indicating a high degree of rurality. However, populations in coastal NC are growing at some of the highest rates in the country. NC coastal populations grew by an average of 92 percent between 1970 and 2010 (NOAA, 2013) and a range of 10–77 percent between 1990 and 2010 (Deaton et al., 2010). While the majority of the growth occurred along the Outer Banks, the historically rural, sparsely populated Inner Banks experienced growth rates between 10 and 20 percent (Deaton et al., 2010). Small-scale commercial fishers are forced to leave the industry and/or their communities as increased demand for housing close to waterfront increases land values, which in combination with low seafood prices and weather-related damages and reduced fishing opportunities decrease the economic viability of commercial fishing livelihoods (Garrity-Blake and Nash 2007, 2012). These circumstances contributed to the further contraction of the commercial fishing industry.

NC has historically ranked in the top 10 percent of seafood producing states across the country (NMFS, 2010). However, in 2008, NC ranked first in commercial fishing industry decline in the South Atlantic region (NMFS, 2010), and has since fallen to 15th out of 24 seafood producing states (NMFS, 2014). Since 2000, the number of active commercial fishers has decreased by 42 percent (NCDMF, 2017a). Between 2000 and 2008, commercial fishing-related industries declined by 57 percent (NMFS, 2010). Garrity-Blake and Nash (2012) documented a 30 percent reduction in fish houses between 2000 and 2006 in NC, with an additional loss of nearly 10 percent by 2011, primarily in the Inner Banks region of the state. This vulnerability context is observable in the transformation of the structures, functions, and identity of the Two Rivers community from commercial fishing-based livelihoods to recreational-based lifestyles.

4.1. Two Rivers fishers' adaptive responses

Two Rivers has historically supported a robust small-scale commercial fishing industry. According to community members, until the 1990s, most of the households in Two Rivers identified as commercial fishing firms and the community supported three fish houses. Since the mid-1990s, small-scale commercial fishing activities and infrastructure

Table 1
Indicators of vulnerability, differential capacity, and adaptive capacity for two rivers, NC (U.S. Census Bureau, 2013).

	Block Group[d]	County	NC	US
Population	1170	47,575	9.6 mil	308.7 mil
Households	517	19,941	3.7 mil	132 mil
Housing Density/mile[a]	17	58	89	90
White, Non-Hispanic	95.8	66.2	64.9	63.3
Poverty	26.0	21.0	17.5	15.4
Median Household Income	42,159	40,429	46,334	53,046
Mean Household Income	55,433	51,449	63,707	73,487
Less than High School, 25 + yrs	13.9	17.9	15.1	14.0
Labor Force, Natural Resources [a]	17.6	7.3	1.4	1.9
Labor Force, Coastal Economy [b]	(100)	82.5	8.1	9.6
Labor Force, Ocean Economy [c]	–	6.9	1.0	2.0

[a] Percentage of labor force in agriculture, forestry, fishing and hunting, and mining (U.S. Census, 2013).

[b] Percentage of all economic activities in the coastal zone (NOEP, 2017).

[c] Percentage of business and jobs dependent on resources extracted from the ocean or physical location on or near the ocean, such as marine construction, fishing and seafood, offshore minerals, ship and boat building, tourism and recreation, and transportation (NOEP, 2015).

[d] Demographic data do not exist for Two Rivers; it is a populated place located within, but nearly 100% coterminous with the geographic boundaries of the block group identified here. Block groups are the smallest geographic unit for which U.S. Census Bureau provides data.

in the community have contracted. At the time of data collection, approximately 20 of roughly 500 households worked in the fishing industry, one fish house had closed with the death of the family matriarch and another had transitioned to recreational services, a sailboat marina and club was opened, and three gated communities were in development. The commercial fishing feet is greying. The average age of Two Rivers fishers interviewed for this study was 61, while the average age of fisherpeople in the Inner Banks region is 52 years (Hadley and Wiegand, 2014). In Two Rivers, young people are being discouraged from entering the fishing industry. Fisherpeople expressed the following sentiment during interviews:

> "It is not something I would advise anybody to get into, especially young people. There is nothing there – it is not there any longer. Used to you could make a living out of it. You wouldn't get rich but you could feed your family and pay your bills. Now you can't do that.

Long-time fishers are increasingly supplementing their traditional pluri-active livelihoods with longer periods outside the fishing industry, while many are permanently transitioning away from fishing. As a local fisher explained:

> "People are having to do something else to keep their family going. There's a lot of them bulk heading; they used to crab pot. They're working carpentry, tug boat, police force, sheriff's department. They have had to change professions to survive. A lot of them that haven't done that, they are not really surviving; they're spinning their wheels. It's getting more like a resort with all of these new people around here."

Moreover, many fisherpeople are moving out of the community and away from the coast. A non-fisher resident of the community since 1943 explained that:

> "The original people down at the beach – especially now that the commercial fishing industry is not as viable as it was – are selling their land that has been in their families for 150 years. You see the gradual decline of the people that were originally here."

The people of the Inner Banks have traditionally been among the most socially vulnerable in NC. In 2008, four of the five counties in the Inner-Banks region were classified as economically distressed with high unemployment rates, high poverty, and low average household incomes (CCSP, 2009). In recent years, inequality has increased in the Inner Banks region. Crawford et al. (2013) found newer in-migrants to the area to have higher incomes and education levels, higher property values, and newer housing than local populations. However, the adaptability of Two Rivers fishers is not completely explained by social and ecological vulnerability. There are indicators of strength in the differential capacities of individuals and groups, and the potential for adaptive capacity at the community level indicative of resilience. These characteristics require a closer examination in relation to governance structures and systemic processes.

5. Analysis & discussion

The following sections explain the transformation of the Two Rivers community by linking the differential capacities of individuals and groups across the structural barriers and opportunities of the policy level of formal fisheries governance and manifestation of the systemic level in the informal governance context of the everyday life of community members. The differential capacities of individuals and groups indicate potential adaptive capacity. The structural barriers and opportunities of the policy level shapes how and by who resources can be mobilized. Systemic imperatives manifest in the context of informal governance, which shapes the means to collectively mobilize differential capacities as adaptive capacity.

5.1. Differential capacities –potential adaptive capacity

Table 1 provides data useful for a general assessment of the vulnerability context, differential power, and potential adaptive capacity of Two Rivers. Data for Two Rivers is represented by the block group[d]. The data in Table 1 indicate vulnerability associated with rural isolation, ocean proximity, and natural resource dependence and reduced adaptive capacity from poverty, inequality (the difference between mean and median incomes), and low levels of education (Cutter et al., 2016; Wisner et al., 2003). All of the economic activity of Two Rivers is located in the coastal zone (NOEP, 2017), indicating susceptibility to storm-related events, such as hurricanes and flooding. A significant proportion of the labor force is in natural resource-based livelihoods (agriculture, forestry, fishing/hunting, and mining) (U.S. Census Bureau, 2013) although ocean resource dependence (percent of labor force in the ocean economy) is low (NOEP, 2015). Natural resource dependence indicates weather and market-related economic vulnerability to fluctuations in primary commodity prices. Poverty is high and the difference between median and mean incomes indicates a higher degree of inequality in Two Rivers compared to the county, which are indicative of the local job opportunity structure (U.S. Census Bureau, 2013) and changing demographics associated with amenity in-migrants.

While the data in Table 1 illustrate vulnerability, strengths and the potential for adaptation toward resilience in the pooling of differential capacities across groups is also apparent. Differential capacity is indicated by the forms of capital (economic, cultural, and social) accessible to and/or controlled by individuals and groups (Bourdieu, 1990). Economic capital includes income and wealth, but also tools and equipment necessary for livelihood activities. Cultural capital refers to the knowledge, skills, and ways of knowing the world acquired from intergenerational and interpersonal relations, lived experience, and/or formal education. Social capital consists of the resources (economic and cultural capital, but also social) available to members through social networks. The utility of capital resource configurations for individuals and groups depends on the institutional context (Bourdieu, 1990); and, differential power stemming from capital assets at the individual and group levels determines the constituent resources of adaptive capacity at the community level.

Differentiation in cultural and economic capital indicated by

occupational, educational, and income diversity is a potential strength. For example, the higher incomes and levels of formal education of non-fisher, non-resource dependent residents in Two Rivers and other coastal areas produce advantages in access to sheer quantity of material goods, technology, and ability to navigate formal institutional arenas, frameworks, and processes. In Two Rivers, a non-fisher resident, who was a lawyer, often assisted people in the community with social service and disability paperwork and, at times, law advice. He was also a frequent participant on coastal habitat conservation committees where, although not an environmental lawyer, his expertise was useful in traversing legal documents, requirements, and processes. In contrast, the lower incomes and education and occupational characteristics of fishers were associated with less liquid capital and less experience, confidence, and competence in formal institutional contexts. The strengths of fishers in Two Rivers derived from specialized equipment and tools and embodied skills, knowledge, and ways of understanding the world derived from tracking elusive fish through opaque media based on geologic, climate, and water conditions.

The economic and cultural capital of fishers in Two Rivers were deployed in a variety of ways beyond livelihood activities in the community. Two Rivers fishers often participated in search and rescue or recovery operations to aid fellow fishers, community members, or tourists in trouble on the water. In such cases, their knowledge of the currents and terrain were invaluable in finding boats or bodies. In the desire to return to work as soon as possible following hurricanes or floods, fishers were often the first to start cleaning debris from roads and waterways and, in the process, their neighbors' yards. Two Rivers fishers often deployed skills in handy-work needs around the community that they picked up out of necessity to keep their boats and equipment operational or as part of their pluri-active lifestyles from construction jobs, such as mechanical, electrical, carpentry, or other work. Two Rivers fisher families also often utilized self-provisioning skills to feed community members in need, whether it was with fish, wildlife, or garden goods.

The pooling of fisher and non-fisher capacities, such as those in Two Rivers has the potential to increase resilience and offset vulnerabilities related to deficiencies in differential capacity by enhancing adaptability for the community. Olson (1965) theorized that diversity in socio-economic status and associated skills, knowledge, and experience has great potential for successful collective provision of public goods if those with the greatest economic interest and power initiate mobilization. The research of Baland and Platteau (1999) supported this proposition, particularly in the context of large start-up costs. This form of cooperative pooling of differential capacities relies on bridging social capital. Bridging social capital is produced by weak ties across heterogeneous social networks consisting of a greater degree of diversity in economic and cultural capital (Flora and Flora, 2013; Granovetter, 1983). In contrast, bonding social capital is produced by close-knit, homogenous social connections, which tend to lack diversity in cultural and economic capital (Flora and Flora, 2013; Granovetter, 1983). Bonding social capital is a basis for solidarity and mobilization of differential capacities at the group level, but potentially poses problems for the collective mobilization of diverse differential capacities into adaptive capacity at the community level. Economic and cultural heterogeneity often produce conflicts of interests, inequality in decision-making processes, and distrust, which create barriers to collective action for the provision of public goods, particularly sustainable resource use (May 2016; Wisner et al., 2003). This was the case for Two Rivers fishers in both formal and informal governance contexts.

5.2. Structural barriers and opportunities in formal governance

The effective deployment of capital assets in the formal governance system depends on structural opportunities and barriers, the differential capacities of other groups, and whether the context is conflictual or cooperative. The formal governance system most pertinent to fisher livelihoods and communities in NC was the state fisheries regulatory system, which consisted of significant structural opportunities for commercial fishers to influence the policies that affect their livelihoods and communities. First, equal access to participation in fisheries co-management for all resource user groups in NC is institutionalized by the state constitution and NC Fisheries Reform Act (FRA) (NCGA, 1997). Second, the state constitution and FRA, along with federal fisheries legislation mandate specific consideration of policy impacts on commercial fishing communities, provision for sustained participation in decision-making processes of commercial fishers, and, to the extent practicable, minimization of adverse economic impacts on commercial fishing communities (MSA, 1996: Sec. 301[a-8]). However, significant barriers also exist in the organizational and legislative imperatives of fisheries governance.

Fisheries governance in the US and NC is required to ensure conservation of marine life and habitat, which increase regulatory oversight of commercial fisheries as a function of the historical structure of fisheries governance. The historical focus of the fisheries regulatory framework on commercial fishing has resulted in extensive development of the means for monitoring and regulatory enforcement of commercial fishing activities and harvests. The development of a regulatory framework for recreational fishing has not yet caught up to the relatively recent growth in recreational fishing activity, which, to a certain extent, is complicated by difficulty in monitoring recreational activities and harvests (for further explanation see May 2015, 2016). The consequence is that regulations to conserve fisheries resources are directed primarily toward commercial fishers to meet conservation goals. This focus is reinforced by the active political involvement of relatively more powerful recreational interest groups in fisheries governance processes.

In general, NC fisheries governance processes are highly conflictual; commercial and recreational fishers compete over territory and fish, within the constraints of conservation limits set by fisheries scientists. However, NC commercial fishers have relatively less access to or control of capital resources advantageous to formal political participation compared to recreational fishers. As shown in Table 2, recreational fishers in the region have higher levels of education and incomes indicative of the economic and cultural capital conducive to the time for political activities and resources and skills to traverse formal institutional and bureaucratic arenas. Similarly, recreational fishers interviewed for this study had cultural and economic capital associated with occupations in medicine, law, education and science, upper management, and financial services.

Recreational fishers also exhibited bonding and bridging social capital, which served to mobilize, connect, and further their interests in political forums for increased recreational and decreased commercial

Table 2
Demographic characteristics of inner banks commercial Fishers and NC recreational anglers.

	Commercial Fishers (Hadley and Wiegand, 2014)	Recreational Anglers (Crosson, 2010)
Population	~ 4000	803,308
White	98.0	92.0
Education		
Less than High School	9.0	28.0
High School or Equivalent	60.0	
Some College or Higher	30.0	72.0
Income		
Less than 15,000	48.0	2.0
15,001–30,000	31.0	8.0
30,001–50,000	13.0	22.0
50,001–75,000	8.0	24.0
$75,001 and more	–	44.0

rights to fisheries resources. All but one of the recreational fishers interviewed for this study were members of recreational fishers' association. Recreational interest groups were well represented on fisheries committees and actively engaged in several activities to influence legislation and public opinion. For example, recreational interests were able to significantly increase regulations on commercial fishers in NC through a lawsuit against the Division of Marine Fisheries (DMF) concerning harm to sea turtles in 2009 (May 2015) and a petition to designate all state coastal waters as secondary nurseries closed to shrimp trawling in 2016 (NCDMF, 2017b).

In contrast, the economic and cultural capital of commercial fishers was less effective in the formal governance realm. Fishers in Two Rivers consistently explained their lack of political activity as a function of lack of time, lack of access to electronic media to receive notice of fisheries meetings or submit comments, and lack of confidence in formal political arenas where language and terms were described as different from what was common to their everyday lives. For example, in discussing the participation of commercial fishers at fishery council meetings, a retired Two Rivers fisher explained:

> "A lot of them wouldn't go. A lot of them were scared to talk in front of somebody. A lot of them just wouldn't go because they didn't feel like they could do any help; they felt like they couldn't speak like they normally should, or wanted to. That was the main thing."

Another local fisher explained that while he does not mind going to the meetings to listen, he never speaks up. He said:

> "I don't get up there. I'm not too much into getting up there in front of people, never have been. The way people talk, they just don't understand; they hear what you're saying but – you got certain words for certain things and it may not be what's in the dictionary."

Commercial fishers in Two Rivers also lacked bridging social capital. While Two Rivers fishers exhibited bonding social capital with other fishers in the community and along the coast of NC, which provided much needed moral support and augmentation of capital resources, it was not a basis for group mobilization. Commercial fishers in other communities were more politically active, but they shared many of the same capital asset characteristics as Two Rivers fishers, which placed them at a disadvantage relative to competing interest groups. Commercial fisher strengths could have been bolstered and mobilized through the aid of a bridging organization (Berdej and Armitage, 2016), but no commercial fisher interviewed in NC was a member of a formal, statewide commercial fisher's association at the time of data collection. General perceptions among commercial fishers were that the state association had been captured by large-scale fishing firms and seafood dealers, which were perceived to have different interests from small-scale fishers. A local fisher explained:

> "I was a member for 20 something years. To be honest with you we don't see eye to eye on a lot of things. In my opinion that association does not represent the small-time fishermen anymore. It is more of a dealer's association, meaning the big fleet groups. The little guys that they started out presenting are no longer represented."

A recreational council representative described the lack of bridging capital as a lack of political representation. He said:

> "I am not convinced that the average commercial fisherman is being adequately represented in the political process. There is one trade group that I have heard a number of commercial fishermen say that it does not represent them and they are not members. It is funded primarily by big dealers and I think that is the representation provided by that group and that does not always mirror the concerns of the individual fishermen."

Weaknesses in formal political arenas can often be offset by collective mobilization in informal governance contexts. However, the conflict characteristic of formal fisheries governance processes in NC were reflected in the informal governance context of the everyday life worlds of Two Rivers fishers.

5.3. Informal governance and the collective action context

Collective mobilization of differential capacities as adaptive capacity at the community level occurs through locally derived and collectively enforced means of controlling and distributing resources and providing public goods through informal governance processes (Ostrom, 1990). These local level processes reflect broader, systemic processes and imperatives, which often go unacknowledged and unexamined in collective action and commons governace research (Scoones, 2015; Taylor and Cheng, 2012). The systemic power of diffuse values, norms, and preferences, which inform daily disciplinary practices, reflect the relationships, institutions, strategies, and technologies of political economic processes and imperatives (Foucault, 1978). In coastal NC, the systemic processes and imperatives of amenity-based rural restructuring was reflected in Two Rivers as diminished closure and, as a consequence, decreased capacity for collective action.

Closure refers to the ability to informally monitor and enforce obligations (Coleman, 1988). As Coleman (1988) noted, access to resources and their conversion to public goods through collective action are reduced as the monitoring and enforcement of social obligations weakens with physical and/or moral distance (decreased face-to-face interactions and consensus in values and beliefs). This dilemma echoes Olson's (1965) and Ostrom's (1990) discussions of group size and formal versus informal regulatory structures. Theoretically, the ability to monitor and enforce social obligations through informal means decreases as anonymity and diversity in beliefs and values increases with increased population size and/or diversity. While moral density provides the grounds for a common understanding of expectations and obligations, physical density provides a means for norm enforcement. Conflict over expectations and understandings and a decreased ability to ensure participation decreases the effectiveness of informal governance processes. While economic transitions related to amenity-led development decreased the relative importance of small-scale commercial fishing in the region, associated demographic transitions in Two Rivers reduced the moral and physical density necessary for closure.

Similar to trends across the world (Kelly and Hosking, 2008; Porter et al., 2018; Wu and Tsai, 2016), recreation and tourism have become increasingly important sectors of the economy in coastal NC. Recreation and tourism provide 88 percent of employment and 55 percent ($1.19 billion) of GDP in NC's ocean economy, which represent 28 and 30 percent increases, respectively since 2005 (NOEP, 2015). Although leisure and hospitality constitute a much smaller portion of employment (12%) and GDP (3.5%) in the broader, more comprehensive coastal economy of NC, respective increases since 2005 are 37 and 33 percent (NOEP, 2017). A Two Rivers fisher's wife explained that:

> "Many years ago, people didn't want to be around the water. Water work wasn't nothing. It was somewhere to go and make a living and that was it. Then people started moving in for summer places and now you see what the water works is. Everybody in the world is trying to get on the water so they can have a boat and so they could go out there and recreational fish. That's what the water works is about now. It's not about commercial fishing. It's about retiring and coming down here and buying property and having a boat so they could recreational fish. It's like everything in the world is about recreation and tourists."

Changing economic and popualtion dynamics resulted in changing belief systems. Reduced moral density in Two Rivers was indicated by conflict over sense of place. Sense of place refers to beliefs about the purpose of a place (Brehm et al., 2013), which define how, by who, and when natural resources should be used. A local fisher said "they're [newer residents] moving here – telling us we can't make a living doing what we have done all our lives." Two Rivers fishers reported that

newer residents complained about the sound of shrimp trawling at night, the sight of fishers working during the day, commercial fisher use of common waters close to private property, and the use of private yards by fishers for storage of capital equipment. Fishers perceived these complaints as effective in increasing restrictions on fisher livelihoods. For example, a fisherman explained "they [NCDMF] went right on and closed the whole river down for night dragging because the people was complaining." A fisherwoman explained a similar incident pertaining to trout lining. She said, "Up until this year we could trout line. We can't even do that now. They [newer residents] say we are messing up their view of the water."

The conflict produced from a lack of moral density is potentially mediated through physical density. Physical density refers to the degree of consistency and frequency of social relationships. Physical density provides the means for monitoring and enforcing obligations and expectations, as well as opportunities to build trust and common understandings. However, physical density between fishers and newer residents in Two Rivers was also lacking. High rates of population growth and economic related out-migration in Two Rivers decreased density of acquaintanceship – the proportion of residents who interact and/or are acquainted with one another (Freudenburg, 1986). Two Rivers fishers often referred to newer residents as "strangers." A local fisher's wife said, "Used to know every one down here, now I barely see the new people much less know who they are." Newer residents were absent from or moved swiftly through common community areas, such as the local convenience store, which served as social hub for community members. Some elusive residents were seasonal homeowners. The number of seasonal homes in NC grew, primarily in coastal areas, by 42 percent between 2000 and 2010, which is the 14th highest rate in the US (Jennings and Krannich, 2013). Opportunities for relationship building were further complicated by the rise of gated communities, which reinforced a sense of physical and moral separation between newer residents and local fishers. A local fisher explained, "The [new] people get so high. They build their houses with the fences around them and at the gates they have this card to get in and video cameras to watch who comes and goes." Regarding the gates and cameras, another local fisher said, "They make me feel like a criminal."

The historical ability of Two Rivers commercial fishers to enforce a sense of place based on commercial fishing livelihoods was reduced by demographics shifts in the community and broader political economic imperatives. As a newer, non-fisher resident of Two Rivers explained:

> "There is a lot of gentrification down here but the people don't usually stay long because the ones that refuse to respect that way of life that is there – the problem is that many of the [fisher] people are gone now. It is getting to be more and more mainstream all the time."

Ultimately, the lack of closure in Two Rivers represented a redistribution of authority within and external to the community, i.e., fishery governance system and the broader political economy. The values, norms, and preferences of broader political and economic imperatives shaped the informal governance system and reproduced the relationship, institutions, strategies, and technologies of amenity-led development in the everyday life world of the community.

6. Conclusion

The transformation of Two Rivers community functions, structures, and identity from commercial fishing-based livelihoods to recreation and leisure-based lifestyles corresponded to the reduced resilience of commercial fishers. Systemic political economic transitions associated with coastal amenity-led development, competitive formal governance processes, and conflict in the informal governance context reduced fisher adaptability to competitive markets and extreme weather events. Commercial fishers were relatively disadvantaged compared to recreational interests in the formal governance system as a result of differential capital resources and the underdeveloped structure of the fisheries management system for regulation of recreational activities. The broader systemic transition from commercial to recreational use of coastal resources redistributed power within and external to the informal governance system of Two Rivers. The amenity transition reduced the relative economic importance of commercial fishing, while demographic shifts reduced closure as diversity in sense of place increased and frequency of physical interactions decreased. Conflict over sense of place and reduced opportunities to build common understandings reduced the capacity for collective adaptive capacity. As a consequence, community wide stocks of human, social, cultural, political, built, financial, and natural capital assets were converted through broader rural restructuring processes to support the conversion of Two Rivers from a commercial fishing to amenity-based community.

The power framework draws attention to how the interrelations of differential and stratified access to resources, institutional and organizational structures, and systemic processes affect group and community adaptability. Adaptive capacity indices have utility in determining correlations between indicators of resources and outcomes in resilience or vulnerability. However, indices do not allow an assessment of process and structure that shape the use of resources. Other approaches, which focus on strength-based community assessments, neglect an examination of internal divisions and external linkages across communities and broader systemic processes and imperatives. Tracing the connections between differential capacities, processes, and institutions that connect groups and communities to governance systems across scales and levels is essential in explaining the context of vulnerability and processes of adaptation in complex socio-ecological contexts. The framework also challenges normative conceptions of community resilience and transformation, which link adaptive responses to a "bounce forward" effect for decreased vulnerability and enhanced sustainability (Chaffin et al., 2016; Cox and Hamlen, 2015; Godfrey-Wood and Naess, 2016; Imperiale and Vanclay, 2016).

The transformation of Two Rivers and much of coastal NC to recreation-based economies is not necessarily more resilient, sustainable, or less vulnerable than the commercial fishing-based economies that were replaced. Rates of exposure and sensitivity to climate change related risks from rising seas and threats to coastal and marine habitat and wildlife are compounded by coastal population growth and development, which increase the number of people affected, the costs of damages, and contributions to coastal erosion, loss of wetlands, and non-point source pollution (Jurjonas and Seekamp, 2017). These enhanced risks are problematic in the context of growth machine politics, which limit risk reduction and environmental protection measures. For example, in 2012, the NC General Assembly passed a four-year moratorium on the use of sea level rise data in coastal development and planning (HB 819 2012) in response to advocacy by local development interests (NC-20 2012). Critics of the moratorium expressed concern for the delay in employing risk reduction measures, such as heightened elevation of coastal structures and expanded buffer zones from the shoreline in the context of rapid coastal development. According to a NC fisheries biologist involved in coastal habitat protection:

> "One of the bigger issues here is we're losing habitat left and right. . . . . We try to put in regulations but the developers and other lobbies have such a strong voice that you try to do things to protect these areas, but that's where the politicians come in. No, you aren't going to allow this stuff to happen. We need the tax base."

The link between community resilience and transformation and beneficial outcomes for socio-ecological systems should not be discarded, but treated as an empirical question. Questions of resilience and/or transformation that ask of what to what, for whom, and how is power involved are integral (Lebel et al., 2006; Nadasdy, 2007; Olsson et al., 2014; Quandt, 2018). The framework presented here has utility in mapping vulnerabilities and capacities against broader structures and systemic processes, which could be used to understand and/or

inform effective collective mobilization within or across communities to improve sustainability. This is particularly important given currently observable and predicted shocks and disturbances from climate change. The weakness of the power framework is its case study emphasis, which limits the generalizability of findings. Beyond the Two Rivers case, the power framework was used to study a cooperative case of community mobilization for coastal resilience in Louisiana (May 2018). A comparative analysis of the failures and successes of the two cases is underway, which will indicate some of the strengths and weaknesses of the framework in explaining community adaptability. However, more data is needed to asses the utility of the framework across resource, political economic, and geographic contexts. There is also a need to determine the complementarity of the framework with existing approaches and quantitative, interdisciplinary modeling of socio-ecological systems.

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Appendix A. Supplementary data

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